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REMARKS

Claims 1 and 3-20 are now pending in the application. Claims 1 and 20 have been amended herein. Claims 2 and 21-23 have been canceled. Favorable reconsideration of the application, as amended, is respectfully requested.

I. REJECTION OF CLAIMS 21-23 UNDER 35 USC §112, 2nd ¶

Claims 21-23 stand rejected under 35 USC §112, second paragraph, as non-compliant for including a trademark. These claims have been canceled, thus rendering the rejection moot. Withdrawal of the rejection is respectfully requested.

II. REJECTION OF CLAIMS 1, 5-10, 15-17, 19 AND 20 UNDER 35 USC §102(b)

Claims 1, 5-10, 15-17, 19 and 20 stand rejected under 35 USC §102(b) based on Acosta *et al.* Withdrawal of the rejection is respectfully requested for at least the following reasons.

Claims 1 and 20 have been amended so as to include the features of original claim 2. Since claim 2 is not rejected on the present grounds, withdrawal of the rejection is respectfully requested. To the extent the Examiner feels the rejection of claim 2 now applies to claim 1, such matter is addressed below.

III. REJECTION OF CLAIMS 2-4, 11-14 AND 18 UNDER 35 USC §103(a)

Claims 2-4, 11-14 and 18 stand rejected under 35 USC §103(a) based on Acosta *et al.* in view of Bryan-Brown *et al.* This rejection is respectfully traversed for at least the following reasons.

As noted above, independent claim 1 has been amended to include the features of claim 2. Specifically, claim 1 now refers to the liquid crystal device as including at least one alignment layer. The alignment layer is provided with a plurality of surface protrusions formed from an anisotropic material. Even more specifically, *the surface protrusions have a height which is at least 10% of the thickness of the liquid crystal.*

In rejecting claim 2, the Examiner contends that it would have been obvious to modify the teachings of Acosta *et al.* so as to have protrusions which extend at least 10,

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20 or 50% of the thickness of the liquid crystal. Applicants respectfully disagree for at least the following reasons.

i. *Present Invention*

The present invention relates to a liquid crystal device which makes use of surface protrusions made from anisotropic materials (e.g., polymerisable reactive mesogens). The surface protrusions serve to nucleate and/or isolate an operating state of the liquid crystal device from a non-operating state. (See, e.g., Spec., p. 9, Ins. 12-16).

ii. *Acosta et al.*

Acosta *et al.* is discussed in the background section of the present application at pages 3-4. Acosta *et al.* teaches a patterned surface pre-tilt to generate nucleation regions. However, the patterns are thin and do not protrude considerably into the liquid crystal. (See, e.g., Spec., p. 3, ln. 16 to p. 4, ln. 2).

iii. *Bryan-Brown et al.*

The Examiner points to Column 4, lines 6-7 and 58-60 in Bryan-Brown *et al.* as purportedly teaching protrusions which have a height of at least 10, 20 or 50% of the thickness of the liquid crystal. Specifically, Bryan-Brown *et al.* teaches:

A plastic cell may be embossed on its inner surface to provide a grating. Additionally, the embossing may provide small pillars (e.g. of 1-3 µm height and 5-50 µm or more width) for assisting in correct spacing apart of the cell walls and also for a barrier to liquid crystal material flow when the cell is flexed. Alternatively pillars may be formed by the material of the alignment layers.

A spacer ring 5 maintains the walls typically 1-6 µm apart. Additionally, numerous beads of the same dimensions may be dispersed within the liquid crystal to maintain an accurate wall spacing.

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a. *Pillars and Spacers*

As is clearly taught in *Bryan-Brown et al.*, the pillars formed by the material of the alignment layers serve as spacers within the liquid crystal device. Specifically, the pillars "assist in correct spacing apart of the cell walls". Similarly, the spacer ring 5 "maintains the walls... apart".

In other words, *Bryan-Brown et al.* teaches those having ordinary skill in the art that pillars or spacers may be provided in a liquid crystal device in order to maintain the correct spacing between the cell walls. Applicants do not dispute that the use of spacers is well known in the art. However, a person having ordinary skill in the art and the teachings of *Bryan-Brown et al.* in their possession would not be motivated to modify the teachings of *Acosta et al.* so as to result in the claimed invention.

More specifically, *Acosta et al.* teaches a thin patterned surface pre-tilt to generate nucleation regions within the liquid crystal layer. A person having ordinary skill in the art would not look to the teachings of *Bryan-Brown et al.* and be motivated to increase the height of the patterned protrusions in *Acosta et al.* to serve as spacers. Such modification would be directly contrary to the teachings of *Acosta et al.*. Specifically, *Acosta et al.* teaches that it is *undesirable* to provide nucleation sites via spacers or pillars within the liquid crystal device. (See, e.g., *Acosta et al.*, Col. 3, Ins. 12-28). Thus, a person would not be motivated to modify the teachings of *Acosta et al.* in a manner which is contrary to the express purpose recited in *Acosta et al.*. Stated another way, *Acosta et al.* teaches directly away from the modification proposed by the Examiner. Thus the rejection of claim 2 (and consequently claim 1) as being obvious in view of *Acosta et al.* and *Bryan-Brown et al.* is improper. Withdrawal of the rejection is respectfully requested.

b. *Alignment Gratings*

Bryan-Brown et al. does teach the provision of alignment gratings to provide a bistable pretilt. (See, e.g., Col. 5, Ins. 19-20). As described in *Bryan et al.*, the presence of the grating allows switching between bistable states by minimizing the energy gap between the two states with respect to the contour of the grating surface.

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(Col. 5, ln. 62- Col. 6, ln. 33; Figs. 4-5). This technique can also be applied to allow switching between a flex state and a twisted state, again by minimizing the energy gap. (Fig. 11).

However, the manner in which the gratings in *Bryan-Brown et al.* stabilize the transition between the two states is completely different to the way that *Acosta et al.* provide nucleation of the second state.

Specifically, in *Bryan-Brown et al.* the protrusions are isotropic and only act on the state of the liquid crystal in terms of the surface contour thereof. As shown in Figs. 4-5, the interaction of the liquid crystal molecules with the surface contour produces deformations which make each of the two states unstable. Therefore, the two states can interchange without a significant energy barrier.

On the other hand, the nucleation protrusions of *Acosta et al.* are anisotropic and act to directly nucleate and stabilize the second state. One skilled in the art, considering both *Acosta et al.* and *Bryan-Brown et al.*, would understand that the physical principles underlying the two references are completely different and thus again there would be no motivation to combine features of the two.

Thus the rejection of claim 2 (and consequently claim 1) as being obvious in view of *Acosta et al.* and *Bryan-Brown et al.* is again improper. Withdrawal of the rejection is respectfully requested.

The various dependent claims may be distinguished over the teachings of *Acosta et al.* and *Bryan-Brown et al.* for at least the same reasons as claim 1 from which they depend. Moreover, the claims may be distinguished based on the particular features recited therein.

For example, claim 5 expressly recites the manner in which the protrusions nucleate the liquid crystal into the operating state from the non-operating state. Claim 12 calls for the protrusions to be twisted anisotropic protrusions. Claim 13 recites that the protrusions are tilted anisotropic protrusions. Claim 14 recites the protrusions as tilted and twisted protrusions. Neither *Acosta et al.* nor *Bryan-Brown et al.* teach or suggest such type of twisted or tilted protrusions. Withdrawal of the rejection of the dependent claims is also respectfully requested.

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IV. CONCLUSION

Accordingly, all claims 1 and 3-20 are believed to be allowable and the application is believed to be in condition for allowance. A prompt action to such end is earnestly solicited.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should a petition for an extension of time be necessary for the timely reply to the outstanding Office Action (or if such a petition has been made and an additional extension is necessary), petition is hereby made and the Commissioner is authorized to charge any fees (including additional claim fees) to Deposit Account No. 18-0988.

Respectfully submitted,

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